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QUICK REVISION MODULE (UPSC PRELIMS 2022) ENVIRONMENT

LAND AND WATTER DEGRADATHON LAND DEGRADATION

UNCCD's definition of Land includes: Terrestrial bioproductive system that comprises soil

Vegetation and other biota

the ecological and hydrological processes

also includes human settlements and infrastructure

Land Degradation

long-term reduction or loss of at least one of the following

biological productivity ecological integrity

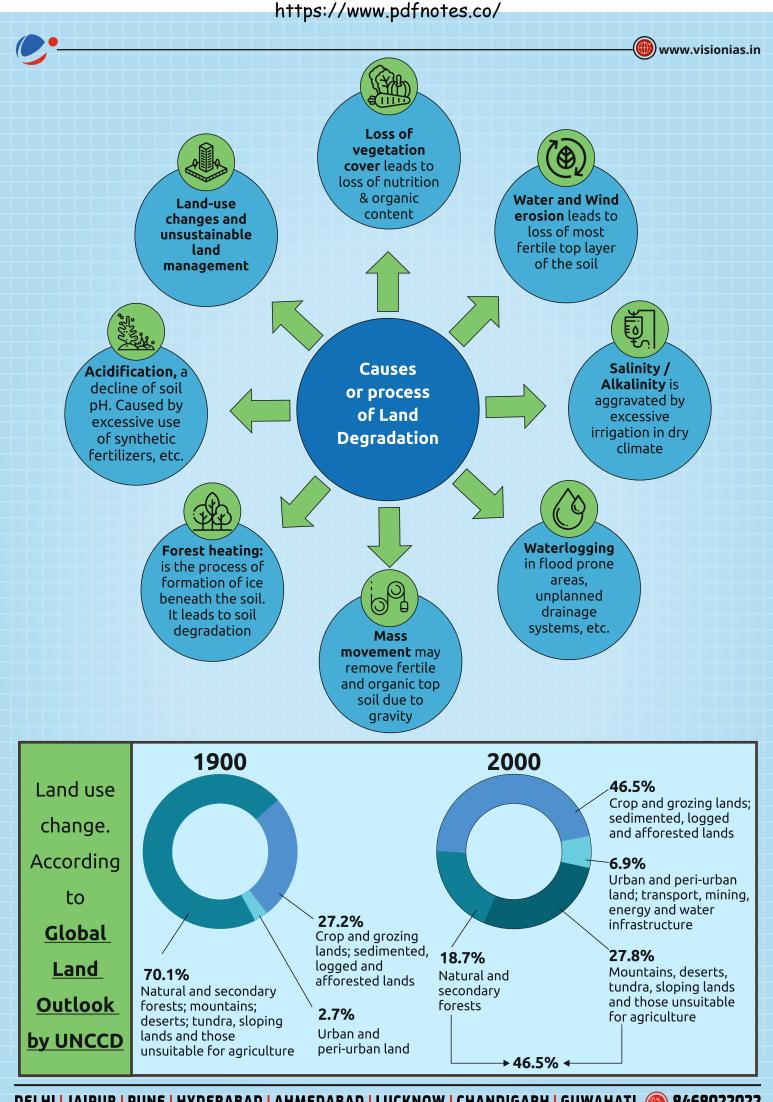
value to

Desertification can be explained as:

It is land degradation in arid, semi-arid and drv sub-humid areas

Can be caused by climatic variation or direct human activities

Extent of Land Degradation: According to FAO, one-quarter of world's land area and more that one-quarter of agricultural land is classified as severely degraded.





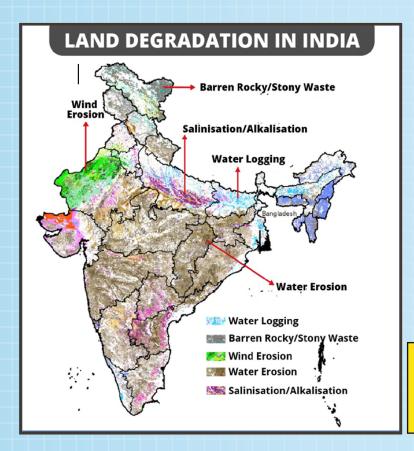


IMPACT OF LAND DEGRADATION

Impacts on	Response on/through		Results in
Ecosystem services	Provisioning services	Ex.– conversion of forest into farmland	Though it increases food availability, it results in a reduction of both biodiversity and carbon sinks.
	Regulation services	Ex.– water regulation services impact	Flooding, drought
	Cultural services	EX.– recreation and tourism	Directly impacted
	Supporting services	Ex.–deforestation and expansion of extensive agriculture	Degradation of natural habitat
Climate	Carbon sink		Land degradation results into scape of carbon from carbon sinks.
	Release of non-CO2 greenhouse gases		Through increased rice cultivation, ruminant stocks and manure disposal results in the higher release of CH4, N20, and NH3 gases.
	Albedo change		Increased grazing, deforestation, and forest fires result in albedo change and thus impacting the global radiative balance, as a result, it leads to net climate cooling/warming.
Food security and poverty	Agricultural productivity		Annual productivity decline undermines sustainable development, food, and water security, and results in human migration and even civil conflict. It affects the weak and the poor disproportionately.
	Gross Domestic Product (GDP)		It has a direct negative and strong impact which is difficult to directly account for. The economic cost in terms of loss of ecosystem goods and services is estimated to be US\$ 6.3 trillion a year equivalent to 8.3% of global GDP in 2016.
Gender and education	It affects the women and children disproportionately and results in increased timing requirements of food production, fuelwood collection.		Children missing schools, a higher dropout rate, reduced child care time, reduced time for other work and for leisure activities. Women have to travel long distances to get water.
Human health	Indirect impact		Through climate change, biodiversity loss, loss in agricultural productivity, etc.
	Direct impact		Can cause chronic bronchitis and respiratory illness.







INDIA

Accounts for 2.4% of world's total land area and 18% of its total population.

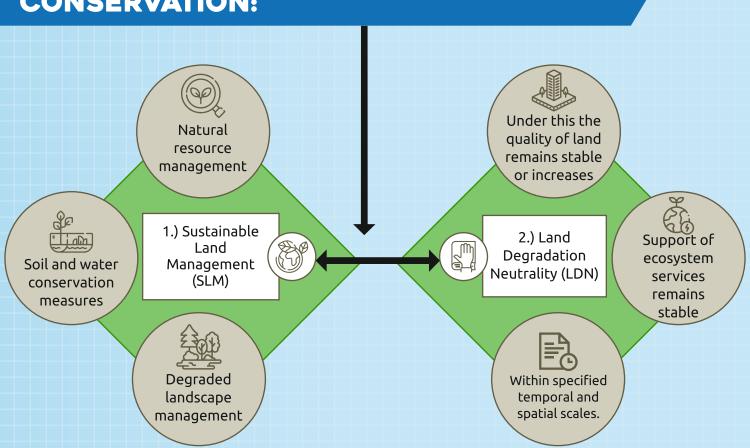
According to the State of India's Environment 2019, 30% of India's total geographical area is affected by land degradation

60% of the land is under cultivation. with agriculture contributing 14% of its GDP.

Land degradation is highly concentrated in some regions. 9 states accounting for 82% of degradation.

Sustainable Development Goal (SDG) 15 (Life on Land), is of direct relevance to land degradation. Target 15.3 specifically addresses Land Degradation Neutrality (LDN).

METHODS OF LAND RECLAMATION AND CONSERVATION:







SLM includes:

Steps taken in India to achieve LDN:

- Reforestation
- Agroforestry
- Terrace cultivation in hilly and mountainous areas
- Sand dunes fixation prevents movement ofsand
- Windbreaks, linear planting of trees and shrubs, to prevent erosion by wind.
- Firebreaks act as barrier in progress of wildfires
- Zai technique Involves digging a pit in soil to catch water and concentrate compost.

- O Comprehensive National Plan to Combat Desertification launched in 2001 for 20 years, talks about community-based approach.
- Desertification and Land Degradation Atlas (2016) by ISRO & others.
- Adopted Bonn Challenge to restore 13-million-hectare of degraded land by 2020 & 8 million more by 2030.
- Government of India in collaboration with global environment facility launched Sustainable Land and Ecosystem Management (SLEM) programme.
- National Green Mission
- Integrated Watershed Management Programme
- At UNCCD COP 14 (New Delhi) 2019, Delhi declaration was adopted. Pledge to restore 26 million hectares till 2030 & to set up a Centre of Excellence at Forest Research Institute, Dehradun.

Adoption of watershed Government' approach towards addressing land degradation approach Integrated treatment Integrated farming based approach Focus on water management Focus on social aspects

Focusing on micro-watershed

Using technologies such as remote sensing and focus on spatial planning.

Govt. launched Integrated Watershed Management Programme (IWMP)

Use of contouring, gully plugging, vegetative as well as engineering-based solution

Fodder and Feed Development Scheme

Involves interrelated, integrating & sustainable approach in farm management

Synergy between cropping, animal husbandry, fishery, forestry, etc.

Eg. National Afforestation Programme, National Mission for Green India.

Aquifer recharge, water budgeting, crop planning, building check dams, etc.

Command Area Development and Water Management (CADWM) programme

Eg. Constitution of Watershed Committee under the Gram Sabha, Social Audit under MGNREGA, joint forest management and social fencing by involving local communities

Other aspects of the government's approach for addressing the problem of land degradation includes 1.) incorporation of livelihood-related activities (through the development of micro-enterprises, SHGs, Mahila Kisan Sashaktikaran Yojana for capacity building of women farmers, etc.)

- 2.) Adoption of climate-adaptation related solution.
- 3.) Increasing role of Panchayati Raj Institutions (PRIs) and Urban Local Bodies (ULBs).





Schemes addressing desertification:				
Schemes	Ministry	Objectives		
Drought Prone Areas programme (DRAP)	Ministry of Rural Development	To minimise the adverse effects of drought on the production of crops, livestock, and productivity of land, water, and human resources ultimately leading to drought proofing of the affected areas.		
Desert Development Programme (DDP)	Ministry of Rural Development	To minimise the adverse effect of drought and control desertification through rejuvenation of natural resource base of the identified desert areas.		
National Watershed Development Program for Rainfed Areas (NWDPRA)	Ministry of Agriculture	To strengthen people's participation in project planning, implementation, and monitoring by generating awareness on the programme measures of the schemes so as to transform watershed management as people's movement with tapering departmental support.		

GLOBAL POLICY RESPONSES TO LAND DEGRADATION:



In 1992 at the Rio Summit land degradation was recognised as a major challenge to sustainable development.

Reducing Emissions from Deforestation and Forest Degradation (REDD+) Aims to encourage developing countries to contribute to climate change mitigation efforts by reducing greenhouse gas emissions. It focuses on sustainable management of forests and enhancement of forest carbon stocks.

The Johannesburg World Summit on sustainable development WSSD in 2002 designated the global environment facility as the funding agency for the implementation of UNCCD.

The **Land for Life Programme** was launched at the UNCCD Conference of the Parties (CoP) 10 to confront the challenges of land degradation and desertification.

The **Born Challenge** is a global effort to bring 150 million hectares of the world's deforested and degraded land into restoration by 2020 and 350 million hectares by 2030.

The UN General Assembly declared the UN Decade on Ecosystem Restoration 2021–2030 (which is co-led by FAO and UNEP), which is expected to shine an additional spotlight on land restoration and mobilise financial resources.

United Nations Convention to Combat Desertification (UNCCD)

- It was established in 1994. UNCCD is the sole legally binding international agreement linking environment and development to sustainable land management. It is one of the conventions adopted during the World Earth Summit at Rio de Janeiro in 1992.
- The convention focuses on arid, semi-arid, and dry subhumid areas, known as the drylands.
- The convention aims at achieving targets of sustainable development goals and poverty reduction by means of arresting and diverting Landy gradation.
- The convention is particularly committed to a bottom-up approach, by engaging people at the local level in combating desertification and land degradation.
- O India became a signatory to UNCCD on October 14, 1994, and rectified it on December 17, 1996.
- OGlobal land outlook is a publication of UNCCD.

Forest Carbon Partnership Facility (FCPF)

- It is a global partnership of governments, businesses, civil society, and indigenous people's organizations.
- O Its focus on reducing emissions from deforestation and forest degradation, forest carbon stock conservation, sustainable management of forests, and the enhancement of forest carbon stocks in developing countries, activities commonly referred to as REDD+
- FCPF supports REDD+ efforts through two separate but complementary funds, the FCPF Readiness Fund and the FCPF Carbon Fund.







Desertification and Drought day is observed by United Nations and celebrated each year on 17th June.

Desertufucation 17 June & Drought Day 🟅 2021

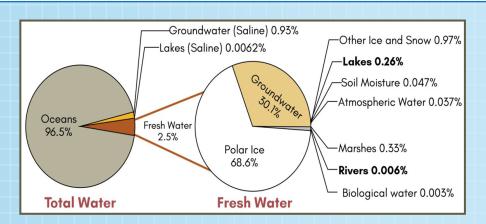
Restoration. Land Recovery. We build back better with healthy

The Green Revolution, based on the use of flood irrigation and chemical fertilizers, has resulted in land degradation and soil salinity. M S Swaminathan the father of the Green Revolution in India calls for an "Evergreen Revolution", which involves the integration of ecological principles, and technological development and dissemination, which can result in improvement in productivity and at the same time can ensure ecological sustainability and social well-being.

WATER DEGRADATION

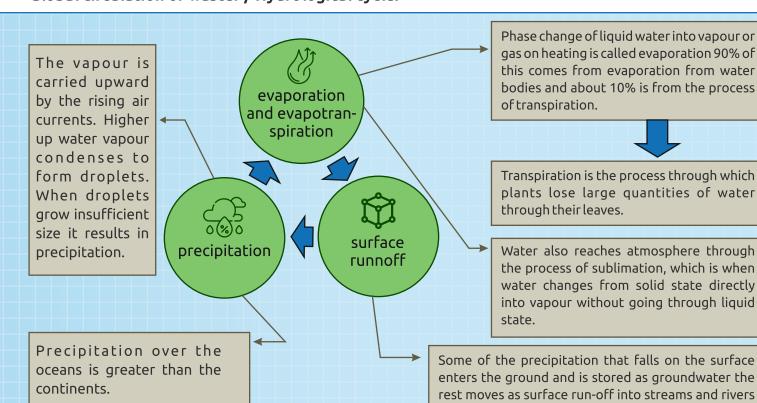
and ultimately flows into the oceans.

Distribution of water on the Earth's surface:

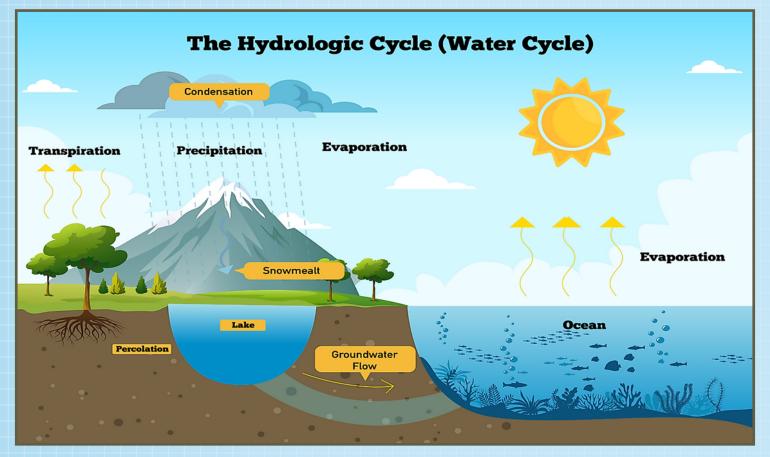


Water covers 71% of the Earths surface. Out of this only 2.5% is freshwater. 68.6 % of the freshwater is locked up in ice and glaciers and 30.1% is in the ground. 1.3% of the freshwater is in lakes, rivers, streams, and clouds, etc.

Global circulation of waster / Hydrological cycle:







Effect of water degradation: Decreased water quantity or flow

Decreased water quality

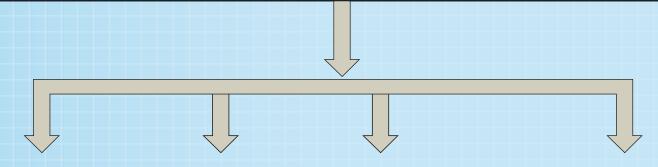
The water table is an underground boundary between the soil surface and the area where groundwater saturates spaces between sediments and cracks in rock. Water pressure and atmospheric pressure are equal at this boundary.







STATUS OF WATER IN INDIA:



India accounts for around 17% of world's population and has only 4% of world's freshwater resources

As per **Composite** Water Management Index (CWMI) report, 2018 published by Niti Aayog.

Dependency on groundwater

India's a (water stressed) country and according to estimates, the demand will exceed supply by a factor of two by 2030.

India is undergoing the worst water crisis in its history and nearly 600 million people are facing high to extreme water

stress.

needs and 50% of urban needs are met by groundwater.

60% irrigation

drinking water

needs, 85% of rural

India uses the largest amount of groundwater and is also the third largest exporter of groundwater.



India exports groundwater through virtual water trade there is through agricultural exports. Example it exported more than 10 trillion liters through Basmati rice export in 2014-15 alone.

India faces a paradoxical situation of floods and droughts. Every year many areas get summarized during the monsoon and on the other hand roads have become common phenomenon in India.

From 1996 to 2015 nearly 19,000,00 7 .5 million people annually were simultaneously affected by floods and droughts, respectively.

According to census estimates (1951-2011), Per-capita water availability has reduced by about 70% in 60 vears.



21 major cities will

groundwater levels

reach zero

by 2020

70% of India's surface water is contaminated

"Day zero situation," is when a city's tap dries out and people have to stand in long lines for water. Example - "Day Zero" situation in Cape Town in South Africa.



About 82% of rural households in India do not have individual piped water supply & 63 million live without access to clean water in their vicinity.

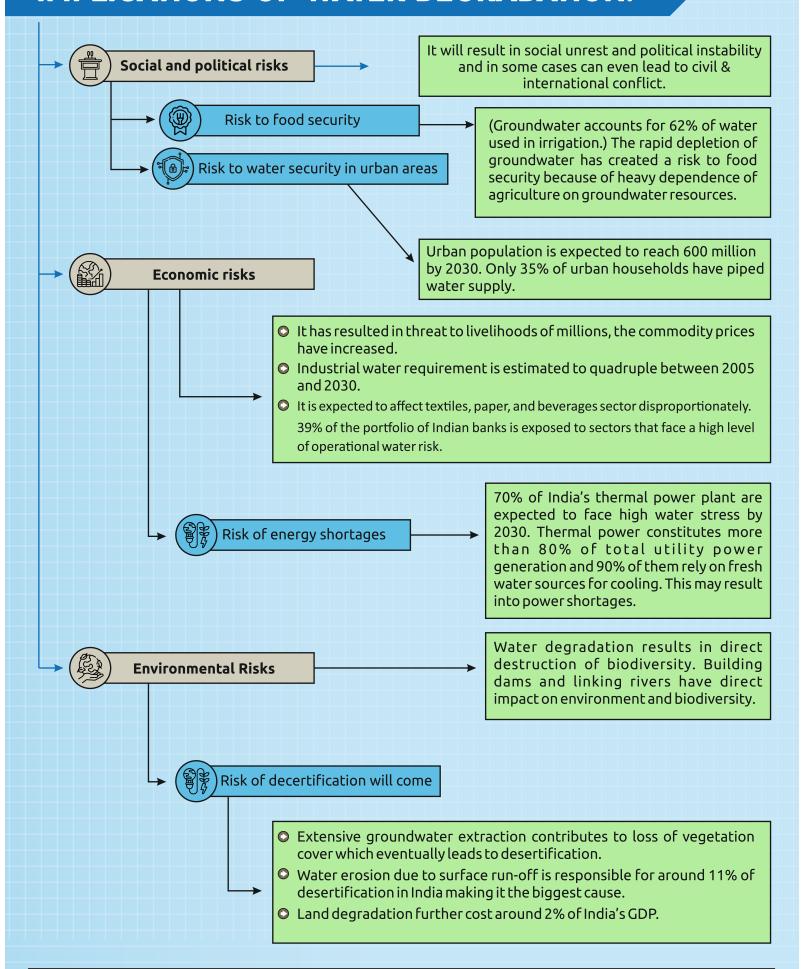


MSPs on water intensive crop and subsidies in electricity consumption has resulted in unsustainable exploitation of groundwater resources by agricultural sector.





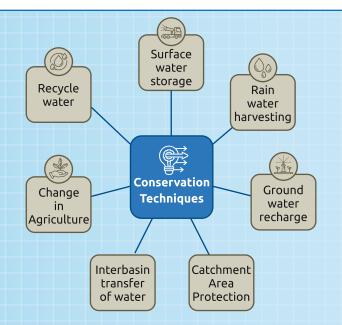
IMPLICATIONS OF WATER DEGRADATION: •







Methods of water conservation:



Methods of rainwater harvesting			
In urban areas	In rural areas		
Roof top rainwater/run- off harvesting through	Rainwater harvesting through		
Recharge pitRecharge trenchTube wellRecharge well	 Gully plug Contour bund Gabion structure Percolation tank Check Dam/Cement plug Recharge shaft Subsurface dyke 		

CATCHMENT AREA PROTECTION AND WATERSHED MANAGEMENT



Catchment area protection includes actions, procedures or installations undertaken to prevent or reduce harm to environmental integrity of drainage areas used to catch water, such as reservoirs or basins.



PM Krishi Sinchai Yojana and World Bank assisted Neeranchal Watershed Program are designed for CAP

Watershed Management Is a process of implementing land use practices and water management practices to protect and improve the quality of water and other natural resources within watershed.



It involves management of those land and water resources in a comprehensive manner

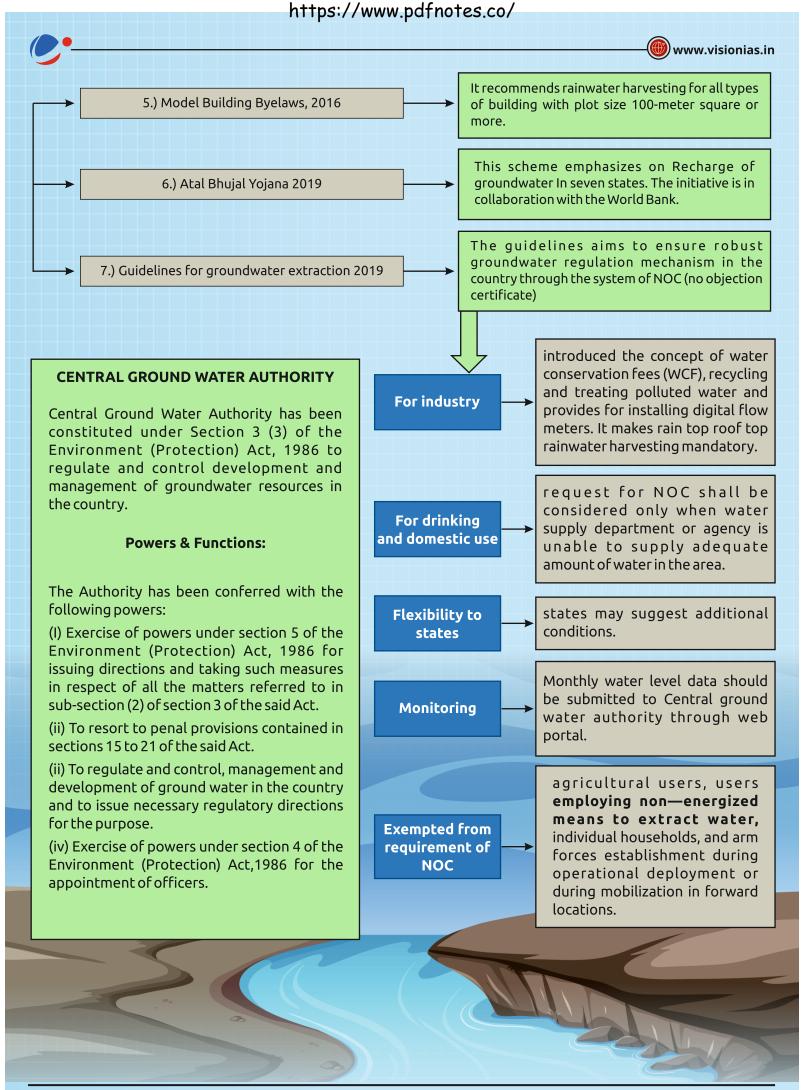
Traditional water conservation systems in various states				
Water conservation system	State and region	Туре		
Jhalaras	Jodhpur (Rajasthan)	Stepwell		
Talab Bandhi	Bundelkhand (UP), Udaipur (Rajasthan)	Lake		
Bawaris	Rajasthan	Stepwell		
Taanka	Thar desert region of Rajasthan	Cylindrical paved underground pit		
Ahar Pynes	South Bihar	Ahars are reservoirs with embarkments on three sides that are built at the end of diversion channels like pynes. Pynes are artificial rivulets.		
Johad	Rajasthan, they are called Madaks in Karnataka and Pemghara in Odisha	Small earthen check dams		





Panam Keni	Wayanad (Kerala)	Special type of well
Khadins	Jaisalmer (Rajasthan)	Embarkments
Kund	Western Rajasthan and Gujarat	Saucer-shaped catchment area
Baoli	Rajasthan, Delhi, Gujarat	Stepwell
Bhandara Phad	Maharashtra	Check dam
Buldhana Pattern	Buldhana district, Maharashtra	Storage type
Tamswada pattern	Nagpur and Wardha, Maharashtra	Storage type
Zings	Ladakh	Small tanks
Kuhls	Himachal Pradesh	Channels
Zabo	Nagaland	Channels
Jackwells	Shompen tribe of the Great Nicobar Islands	Wells
The Ramtek model	Maharashtra	Tanks
The Pat system	Jhabua district of Madhya Pradesh	Channels
The Eri system	Tamil Nadu	Tanks

India's Policy Framework In international policy frameworks such as Sustainable Development Goals (SDG), Paris Agreement & Sendai Framework have **convergence on water conservation** and its responsible use to ensure sustainable 1.) Creation of a new Ministry of Jal Shakti development, ensuring livelihood security for poor and the weak and reduced risks from disasters. This step aims at dealing with all matters relating to water in one place in an integrated manner to enable better decision making for surface water projects and allocation. It aims at improving efficiency in agriculture using techniques such as micro-irrigation. It is a comprehensive scheme and deals with 2.) Pradhan Mantri Krishi Sinchai Yojana (PMKSY) watershed development, afforestation, soil and moisture conservation, rainwater harvesting, horticulture, pasture development, etc. 3.) Composite Water Management Index (CWMI) is published by Niti Aayog to encourage cooperative and competitive federalism in water conservation and its management. The policy advocates rainwater harvesting and conservation of water. It also focuses on conservation of river & other water bodies and 4.) National Water Policy 2012 lays emphasis on scientific infrastructure development.







Water policy timeline in india



recognized

Supreme court recognizes 'right to water' as a part of right to life



riverlinking revitalized

Govt. allocates funds to prepare detailed project reports



Ministry of water Resources, River Development & Ganga Rejuvenation established

Several functions consolidated under central Ministry of Water Resources



Model Groundwater Bill framed

Govt. publishes initial bill asserting state control over groundwater extraction

2000

2005

2010

2015

2018



National Water **Policy** revamped

Policy focus shifts to treating water äs an economic good for ĕfficient



DDUGJY launched

Govt. begins separating electricity feeders for agriculture, reducing incentives for excess irrigation



PMKSY launched

Govt. expands efforts to make irrigation more efficient, with a focus on microirrigation



water partnership formalized

Govt. signs MOU to leverage Israel's expertise for a National Campaign for water Conserva-tion in India

SUCCESSFUL MODELS OF DECENTRALIZED WATER MANAGEMENT

MUKHYA MANTRI JAL **SWAVLAMBHAN** ABHIYAN (MJSA)

Of Rajasthan a multistakeholder programme which aims to make villages self sufficient in water

adopts a participatory water management approach

Use technology and focus on creation of water conservation structure

NEERU-CHETTU **PROGRAMME**

ANDHRA PRADESH

Aims at droughtproofing the state and reduce economic inequalities

Focus on improving providing water in drought prone areas

The programme focus on use of scientific technology and repair and renovation.

JALYUKT SHIVAR **ABHIYAN**

Maharashtra

Aims to make Maharashtra drought-free with focus on 5000 water scarce villages

The approach of this programme focuses on deepening and Widening of streams and construction of check dams.

The program also harnesses technologies such as geo-tagging of water resources.

aims to restore over

minor irrigation structures, promoting community based irrigation management, and restoration of tanks